



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/930,361	08/15/2001	Kazuaki Ano	TI-33184	3433

23494 7590 05/06/2003

TEXAS INSTRUMENTS INCORPORATED  
P O BOX 655474, M/S 3999  
DALLAS, TX 75265

EXAMINER

LANDAU, MATTHEW C

ART UNIT PAPER NUMBER

2815

DATE MAILED: 05/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/930,361

Applicant(s)

ANO, KAZUAKI

Examiner

Matthew Landau

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 25 February 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-11 and 18-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7 is/are allowed.
- 6) ☒ Claim(s) 1-6, 8-11 and 18-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 October 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the encapsulant that “does not cover said portion of said sheet metal in said opening coplanar with said second surface of said substrate” must be shown or the features canceled from the claims. Note that Figure 1 of the instant application shows the encapsulant covering a portion (the top surface) of the sheet metal in said opening. No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 19 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is unclear how the encapsulant can cover the chip but not cover “said portion of said sheet metal in said opening coplanar with said second surface of said substrate”, since the chip is mounted on that portion. Figure 1 of the instant application shows an encapsulant 108 covering

Art Unit: 2815

the portion (the top surface) of the sheet metal 105b in the opening. Therefore, it is unclear what applicant intends to claim.

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2, 4-6, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Johnson.

In regards to claim 1, Figure 6 of Johnson discloses a tape 1 having first and second surfaces comprising: a plurality of contact lands and conductive routing lines integral with said first surface of said tape; and a chip mount pad 10 secured to said first surface, coplanar with said second surface.

In regards to claim 2, Figure 6 of Johnson discloses a tape 1 having first and second surfaces and first and second openings, for use in the assembly of semiconductor chips, comprising: a plurality of electrically conductive routing lines and a plurality of contact lands on said first surface, covering said first openings in said tape; and a chip mount pad 10 in each of said second openings, attached to said first surface and shaped to be coplanar with said second surface.

Art Unit: 2815

In regards to claim 4, the presence of the process limitation “created by a photolithographic patterning and chemical etch process” does not patentably distinguish over prior art, therefore cannot impart patentability to the product.

In regards to claim 5, the presence of the process limitation “provided by a mechanical coining process” does not patentably distinguish over prior art, therefore cannot impart patentability to the product.

In regards to claim 6, the presence of the process limitation “created by a mechanical punching process” does not patentably distinguish over prior art, therefore cannot impart patentability to the product.

In regards to claim 18, Figure 6 of Johnson discloses a packaged integrated circuit comprising a substrate 1 having first and second opposing surfaces; said substrate including an opening extending through said substrate from said first surface to said second surface; a chip mount pad 10 comprising a sheet of metal (copper), a portion of said sheet of metal on said first surface of said substrate and a portion of said sheet of metal covering said opening such that said portion of said sheet of metal covering said opening is coplanar with said second surface of said substrate, said portion of said sheet of metal covering said opening having a first and second opposing surfaces, said second surface of said sheet of metal covering said opening being coplanar with said second surface of said substrate; an integrated circuit chip 6 mounted on said first surface of said sheet of metal in said opening.

Art Unit: 2815

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson in view of Ikegami.

The difference between Johnson and the claimed invention is the routing lines and contact lands made of copper foil plated with nickel and gold. Ikegami discloses a pad electrodes formed by etching copper foil and further plated with nickel and gold (see column 1, lines 55-60). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by using copper foil plated with nickel and gold for the wiring pattern. The ordinary artisan would have been motivated to modify Johnson in the manner described above for the purpose of preventing corrosion and enhancing the electrical conductivity.

7. Claim 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson in view of Cheng.

In regards to claim 8, Figure 6 of Johnson discloses a low-profile, high power semiconductor device including: a plastic tape 1 having first and second surfaces; a plurality of electrically conductive routing lines and a plurality of contact lands on said first surface, said

Art Unit: 2815

lands exposed by first openings in said tape; second openings in said tape configured to accommodate the chips; a chip mount pad 10 covering each of said second openings, attached to said first surface and shaped to be coplanar with said second surface; a circuit chip 6 mounted by means of a thermally conductive material 15 on the chip mount pad; encapsulating material 16 surrounding said first tape surface; and solder balls 7 attached to each of the exposed lands. The difference between Johnson and the claimed invention bonding wires connecting said chip to said contact lands. Figure 2 of Cheng discloses a circuit chip 21 connected to on a substrate 24 by way of both bonding wires 212 and conductive leads 222. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by including bonding wires to connect the chip to the contact lands. The ordinary artisan would have been motivated to modify Johnson in the manner described above for the purpose of providing an additional means for controlling operation of the chip circuitry.

In regards to claim 9, Figure 6 of Johnson discloses chip mount pads 10 which provide a direct thermal path to the circuit chips 6.

In regards to claims 10, the presence of the intended use limitation "...chip mount pads serve as a heat convection surface..." does not structurally distinguish over the prior art, therefore cannot impart patentability to the claimed device.

In regards to claim 11, the presence of the process limitation "created by a transfer molding process" does not patentably distinguish over the prior art, therefore cannot impart patentability to the product.

Art Unit: 2815

8. Claims 19-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson in view of Carter, Jr. et al. (US Pat. 5,594,234, hereinafter Carter).

In regards to claim 19, Figure 6 of Johnson discloses an encapsulant 3 covering a portion of a first surface of the substrate but does not cover a second surface of the substrate and an encapsulant 16 covering the chip 6. As best the examiner can ascertain the claimed invention, the difference between Johnson and the claimed invention is the encapsulant does not cover the second surface of said sheet metal covering said opening. Figure 12 of Carter discloses an encapsulant 79 that does not cover a bottom surface of a chip mount pad 82. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by an encapsulant that does not cover the second surface of the mount pad. The ordinary artisan would have been motivated to modify Johnson for the purpose allowing direct attachment of a heatsink to the mount pad.

In regards to claim 20, the difference between Johnson and the claimed invention is a heatsink attached to said second surface of said sheet metal covering said opening. Figure 12 of Carter discloses a heatsink 86a connected to a die mount pad 82 on the surface opposite to the die 83. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by including a heat sink attached to the second surface of the chip mount pad. The ordinary artisan would have been motivated to modify Johnson in the manner described above for the purpose of dissipating heat from the semiconductor device.

In regards to claim 21, the difference between Johnson and the claimed invention is the second surface of the sheet metal attached to a printed circuit board. Figure 12 of Carter



Art Unit: 2815

discloses a printed wiring (circuit) board 84 connected to the bottom surface of a die mount pad 82. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by attaching the second surface of the sheet metal to a printed circuit board. The ordinary artisan would have been motivated to modify Johnson in the manner described above for the purpose providing an external connection to the circuit chip.

In regards to claim 22, Figure 6 of Johnson discloses a packaged integrated circuit comprising a substrate 1 having first and second opposing surfaces; said substrate including an opening extending through said substrate from said first surface to said second surface; a chip mount pad 10 of metal foil attached to said first surface of said substrate and downset into and covering said opening such that a bottom surface of said chip mount pad is coplanar with said second surface of said substrate; an integrated circuit chip 6 mounted on a top surface of said chip mount pad; encapsulation (3,16) on said first surface of said substrate and not on said second surface of said substrate, such that said encapsulation covers said chip. The difference between Johnson and the claimed invention is the encapsulant does not cover said bottom surface of said chip mount pad. Figure 12 of Carter discloses an encapsulant 79 that does not cover a bottom surface of a chip mount pad 82. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by an encapsulant that does not cover the bottom surface of the mount pad. The ordinary artisan would have been motivated to modify Johnson for the purpose allowing direct attachment of a heatsink to the mount pad.

Art Unit: 2815

In regards to claim 23, the difference between Johnson and the claimed invention is a heatsink attached to said bottom surface of said chip mount pad. Figure 12 of Carter discloses a heatsink 86a connected to a die mount pad 82 on the surface opposite to the die 83. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by including a heat sink attached to the bottom surface of the chip mount pad. The ordinary artisan would have been motivated to modify Johnson in the manner described above for the purpose of dissipating heat from the semiconductor device.

In regards to claim 24, the difference between Johnson and the claimed invention is the bottom surface of the chip mount pad attached to a printed circuit board. Figure 12 of Carter discloses a printed wiring (circuit) board 84 connected to the bottom surface of a die mount pad 82. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by attaching the bottom surface of the chip mount pad to a printed circuit board. The ordinary artisan would have been motivated to modify Johnson in the manner described above for the purpose providing an external connection to the circuit chip.

9. Claims 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson in view of Cheng and Carter.

In regards to claim 25, Figure 6 of Johnson discloses a substrate 1 having first and second opposing surfaces including an opening extending through said substrate from said first surface to said second surface, said opening having a first size; a plurality of contact lands on said first surface of said substrate adjacent to said opening; a chip mount pad 10 of metal foil attached to

Art Unit: 2815

said first surface of said substrate and downset into and covering said opening such that a bottom surface of said chip mount pad is coplanar with said second surface of said substrate; an integrated circuit chip 6 mounted on a top surface of said chip mount pad, said integrated circuit chip having a second size, wherein said second size is smaller than said first size; and encapsulation (3,16) on said first surface of said substrate and not on said second surface of said substrate, such that said encapsulation covers said chip. The difference between Johnson and the claimed invention is the encapsulant does not cover said bottom surface of said chip mount pad. Figure 12 of Carter discloses an encapsulant 79 that does not cover a bottom surface of a chip mount pad 82. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by an encapsulant that does not cover the bottom surface of the mount pad for the purpose allowing direct attachment of a heatsink to the mount pad. A further difference between Johnson and the claimed invention is bond wires coupling said integrated circuit chip to said contact lands. Figure 2 of Cheng discloses a circuit chip 21 connected to on a substrate 24 by way of both bonding wires 212 and conductive leads 222. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by including bonding wires to connect the chip to the contact lands. The ordinary artisan would have been motivated to modify Johnson in the manner described above for the purpose of providing an additional means for controlling operation of the chip circuitry.

In regards to claim 26, Johnson discloses the substrate 1 is plastic tape (column 2, lines 32-36).

Art Unit: 2815

***Allowable Subject Matter***

10. Claim 7 is allowed.

The following is a statement of reasons for the indication of allowable subject matter: the prior art of record does not disclose either singularly or in combination “first and second openings through said tape and adhesive layer.”

***Response to Arguments***

11. Applicant's arguments regarding claims 1-6, 8-11, and 18-26, filed February 25, 2003, have been fully considered but they are not persuasive.

In response to Applicant's arguments in regards to claim 1, the recitation “reel-to-reel tape” has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). Furthermore, Applicant's argument that “element 10 is Johnson's Figure 6 is a lead, not a chip mount pad” is not persuasive. If the metal foil 105 of the instant application can be a chip mount pad (page 7, lines 11-13), there is no reason why the lead 10 of Johnson cannot be a mount pad. Note that at no point does the Johnson reference suggest encapsulant 16 supports the chip. Also, Johnson's use of both the words “pad” and “lead” does not mean the lead 10 cannot be considered a mount pad.

In response to Applicant's arguments in regards to claim 18 that Johnson fails to disclose a portion of said sheet metal covering said opening, note that Figure 6 of Johnson discloses a portion of said sheet metal covers at least part of said opening. Note, Applicant presents similar arguments for claims 8, 19-22, and 25.

In response to Applicant's arguments in regards to claim 19 that "Carter's package is a leadframe-based package and thus does not include a substrate. The skilled artisan would receive no motivation from Johnson or Carter to combine Carter's teachings with those of Johnson", the Carter reference is drawn to a package for a semiconductor die. Therefore, Johnson and Carter are drawn to the same scope of invention. The motivation to combine the references was provided in the above rejection.

### ***Conclusion***

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

Art Unit: 2815

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew C. Landau whose telephone number is (703) 305-4396.

The examiner can normally be reached on 8:00 AM-4: 30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



**EDDIE LEE**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 2800**

Matthew C. Landau

Examiner

May 5, 2003